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materials for microscopic work. During the month the school will plant tulip, hyacinth, and other bulbs in the school ground in preparation for the flower and vegetable garden to be made in the spring.

V. *Practice teaching*.—When the students can show by a carefully prepared plan that they are ready to give a series of lessons under some one of the foregoing topics, arrangements will be made for such lessons to be given either in the model school or before members of the professional school. These plans must show grasp of subject-matter and power of adaptation to the needs and conditions of those for whom the work is prepared.

VI. *Pedagogical notes*.—The method in teaching the lessons outlined in nature study will involve the following points :

1. Gathering of data : This will be by direct observation.
2. When possible, that is, when quantities are considered, a careful *determination of proportions*; this will involve appropriate measurements and mathematical calculation.
3. The facts represented in the data *must be rendered objective* in some manner which will graphically and clearly represent the various relations observed. As, for example, the variation of sunshine distribution, of rainfall, etc., must be represented by actual areas, and amounts so measured and represented as to present the facts clearly to the senses
4. The facts derived from the data *must be reincarnated in a great nature-picture*; that is, for example, when (1) the rainfall on a small area of a few square inches has been observed; and (2) after its amount has been determined; and (3) after this has been actually measured out, so that the pupil can realize through the senses what it means; then (4) the great nature-picture must be developed by showing what this amount means for a given area, say the garden, a corn field, or the corn belt, wheat belt, etc. Unless the fourth point is reached, the work will lack that practical application which is the final stimulus for the study. It is through the development of the great nature-picture that man's relations will appear. The *great nature-picture* is thus the beginning of the pupil's observation, and is the end of all his investigation. All else are but intermediary processes.

FIELD WORK.

IRA B. MEYERS.

Plant life.—A general survey of any considerable area leads to the discovery that plants are not distributed indiscriminately, but that their occurrence is determined, to a greater or less degree, by the topographic features of the area—stream margins, swamps, prairie, bluffs, uplands—each feature having some distinguishing characteristic in the nature and grouping of its vegetative covering. These characteristic groups are frequently termed "plant societies," and are known as swamp societies, prairie societies, rock societies, etc., according to the nature of the topographic features.

One phase of plant study is the investigation of various plant societies to determine (1) the plants that give the society its characteristic physiognomy; (2) the factors which determine the presence of these plants in the society. Such investigation soon leads to the discovery that frequently various plant species are so grouped as to form zones. In a swamp society the plants within the water margin differ from those just on the water border; and these in turn differ from the ones farther back. These zones may in turn contain many smaller groups, or patches, of a single specie—water lilies, arrow heads, strawberries. It may also happen that plants associated with one special feature, a pond, may be found in a different, but closely related, area, a dry bog. Plants that have begun growth under certain conditions, and persist after their original habitat has changed, are termed remnant plants.

A series of well-organized excursions should familiarize students with the characteristic plants, and their conditions of living, in each of the more prominent topographic features of their home area. They should at the same time note what factors (heat, light, moisture, soil, etc.) have most influenced the formation of each society.

Through the agency of erosion and various forms of deposition, topographic features are changing, the margins of lakes and ponds become marshes and meadowland. Streams shift their positions, leaving dry land (alluvial deposits) where there was once running water; their banks give way on account of basal erosion, leaving newly exposed portions of rock and soil. Each newly exposed bit of soil offers an area for growth where plants did not previously exist. Such areas frequently afford a key to the formation of various plant societies, since plants will tend to develop and succeed each other, up to certain stages, according as the conditions for growth become better on the area.

DIRECTION FOR STUDY.

Duplicate your topographic map.

1. Indicate on it the location of the principal plant societies.
2. Make a list of characteristic plants of each society.

NOTE.— Make an enlarged map of the society studied and indicate on it the position of these characteristic plants in the society.

3. What factors have most influenced the occurrence, form, structure, and growth of plants in each society?

Consider: 1. *Moisture*.—(a) Amount available to plants in different parts of the area. (Determined by finding the moisture contents of the soil. For details of this experiment see "Variation at Different Seasons of the Year on the Area," Jackman's *Nature Study for Grammar Grades*, p. 47.) (b) Part of the plant most directly related to moisture; (1) part of the plant (organ) concerned in securing moisture; (2) structure concerned in retaining moisture. (c) Modifications of these structures or organs as adaptations to various moisture conditions.

2. *Soils*.—(a) Relation of soils to plants as food; (b) relation of soil to plants as to their capacity for absorbing and retaining moisture; (c) physical properties of soils as related to plant rooting.

3. *Slope*.—Influence of direction of hill or ravine slope on (a) moisture, as affected by exposure of a slope to wind or sun; (1) measure the angle made by the sun's rays on level surface, on south slope, on north slope; (2) compare the surface temperature readings on each slope.

4. *Light*.—(a) Part of plant directly related to sunlight; (b) adaptations by which plants avoid shading from their own foliage and from surrounding plants.

5. *Distribution*.—Ways by which plants get into an area; (a) agents of distribution; (b) structural adaptations to these agents.

REFERENCES: Cowles, *Plant Societies of Chicago and Vicinity*; Coulter, *Plant Relations*; *First Ohio Weed Manual*; Gaye, *The Great World Farm*; King, *The Soil*.

GEOGRAPHY.

ZONIA BABER.

THE work in geography for October for the pupils in the Elementary School will be based on the field work done in the region of Chicago. An outline for the year's work for the Elementary School will appear in the November number.

Two courses will be given in geography for pedagogic students:

Course A, for entering students, will be based upon field trips to the ravines along the north shore, the Chicago river, the old and the new canal, sand dunes at Dune Park, and to a farm. The work of streams and wind as surface-shaping agents, and man's adaptation to resultant conditions, will be especially considered.

Course B, for students familiar with Course A, will be the consideration of the study and teaching of Eurasia (see COURSE OF STUDY, Vol. I, No. 10).

SUGGESTION ON FIELD WORK.

A study of nature or culture products in natural relations adapted to any region.

The value of landscape as a potent factor in intellectual and æsthetic development needs little argument, but the means by which the highest value may be obtained from its study requires deepest consideration. Living in a region where the arrangement of lines, surfaces, and colors produces the most pleasing effect, which we call beautiful scenery, by no means insures the inhabitant a high æsthetic development. Nor does a residence in a region where nature has displayed, or is displaying, her most valued secrets of landscape-making declare a high appreciation of natural law on the part of the